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CASE REPORT

Pilsicainide intoxication presenting as left ventricular dyssynchrony in a patient on hemodialysis

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Summary We report here a case of pilsicainide intoxication presenting as left ventricular dyssynchrony in a patient who had been treated on hemodialysis. This is the first report that assessed cardiac function during pilsicainide intoxication by left ventriculography and right heart catheterization.

Introduction

Pilsicainide is a class Ic antiarrhythmic agent and is largely excreted via the kidney [1]. Pilsicainide intoxication has been reported in patients with renal dysfunction [2,3]. We report here a case of pilsicainide intoxication presenting as left ventricular dyssynchrony in a patient who had been treated on hemodialysis. This is the first report that assessed cardiac function during pilsicainide intoxication by left ventriculography and right heart catheterization.

Case report

A 65-year-old man was admitted to our hospital because of chest pain on 26 March 2008. He had been diagnosed with diabetes mellitus and hypertension at age 45 years. He had developed renal failure and had been treated with hemodialysis at a local hospital since he was 63 years old. He had taken pilsicainide (50 mg/day) for arrhythmia. On 26 March 2008, he suffered from chest pain and palpitation, and he was admitted to his local hospital. He was diagnosed with acute myocardial infarction and transferred to our hospital. On admission, his blood pressure was 89/37 mmHg and pulse rate was 100 bpm. His height was 160 cm and body weight was 65 kg. Electrocardiogram showed ST depression in I, II, aVF, V1 ~ 6 leads with wide QRS and marked QT prolongation (Fig. 1). Chest X-ray showed mild cardiomegaly (Fig. 2) Echocardiogram showed severe left ventricular dysfunction in apex. Laboratory data indicated azotemia and hyperkalemia (Table 1). Emergent coronary angiography revealed no occlusion of epicardial artery. Left ventriculography showed dyssynchronous wall motion (delayed contraction in basal portion and apical dyskinesis) without mitral regurgitation (Fig. 3).

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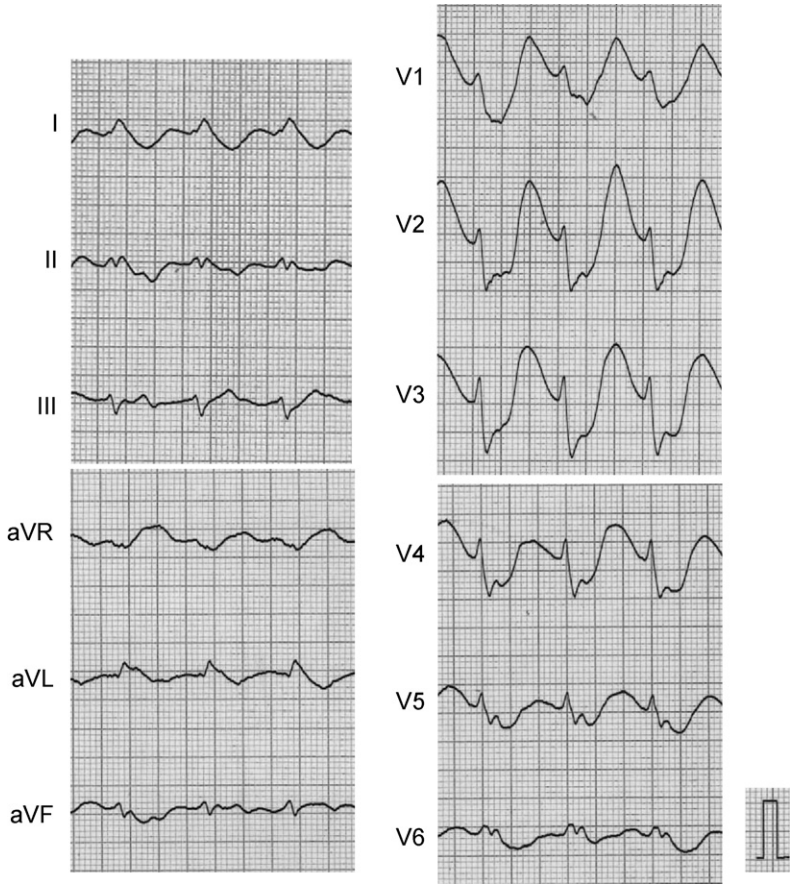

Figure 1 Electrocardiogram on admission.

Right heart catheterization showed decreased cardiac index (2.42 l/(min m^2)) and stroke volume index (34.6 ml/(beat m^2)) and elevated mean pulmonary artery wedge pressure (15 mmHg). After cardiac catheterization, it had been apparent that serum concentration of pilsicainide on admission was 2.75 μg/ml (therapeutic level 0.2 ∼ 0.9 μg/ml). Then, we diagnosed pilsicainide intoxication. Pilsicainide was discontinued, and hemodialysis was performed. After hemodialysis, electrocardiography showed Brugada-type pattern. Then QRS had

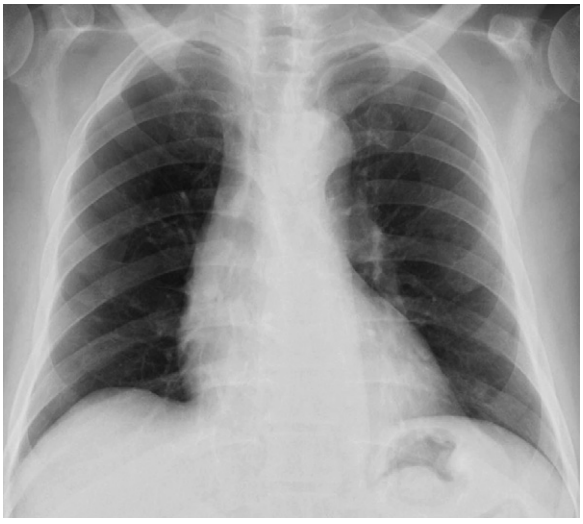

Figure 2 Chest X-ray on admission.

Table 1 Laboratory data on admission

White-cell count (per mm3)	12,400
Hemoglobin (g/dl)	15.9
Platelet count (per mm^3)	14.6×10^4
Creatinine (mg/dl)	13.0
Urea (mg/dl)	64
Sodium (mEq/l)	137
Potassium (mEq/l)	6.5
Chloride (mEq/l)	99
Albumin (g/dl)	3.9
Aspartate aminotransferase (IU/l)	14
Alanine aminotransferase (IU/l)	21
Lactate dehydrogenase (IU/l)	267
Creatine kinase (IU/l)	140
Glucose (mg/dl)	196
Brain natriuretic peptide (pg/ml)	219

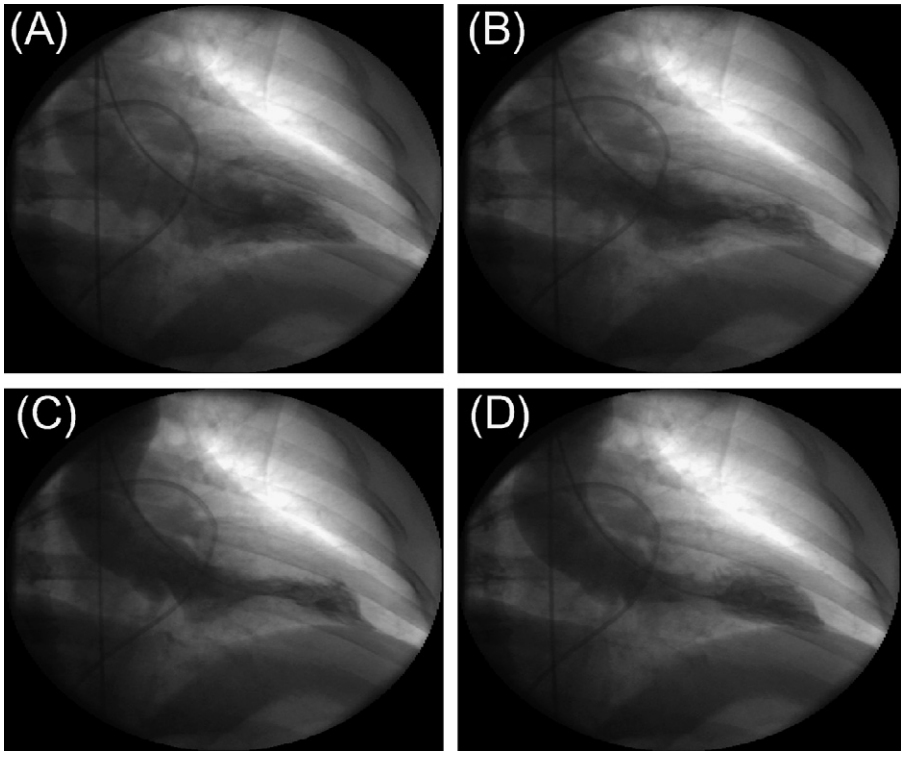

Figure 3 Left ventriculography on admission. Basal portion contracted later than midventricular portion. Apical portion showed dyskinetic motion. (A) End diastole, (B) early systole, (C) late systole and (D) end systole.

gradually narrowed, and electrocardiographic findings had become normal (Fig. 4). Blood pressure had gradually elevated and chest symptoms had not recurred. Ventricular tachyarrhythmia had not appeared and in-hospital course was uneventful. Left ventriculography on 18 days from admission showed normal left ventricular function. Right heart catheterization showed improved cardiac index ($3.00\,l/(min\,m^2)$) and stroke volume index ($45.1\,ml/(beat\,m^2)$).

Discussion

Pilsicainide is a pure sodium channel blocker with slow recovery kinetics [4]. This drug has been

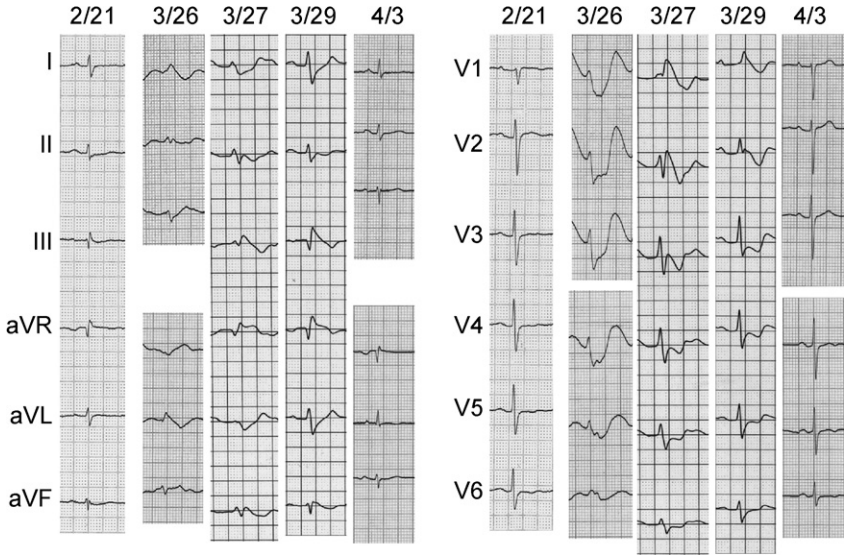

Fig. 4 Serial changes on electrocardiogram.

shown to increase PQ interval, QRS width, and QTc, and prolongation of these variables was well correlated with the plasma levels [2,5]. Pilsicainide intoxication has been known to cause ventricular tachycardia, sinus pause, and various degrees of atrioventricular block [2,3,6]. Pilsicainide is largely excreted via the kidney and pilsicainide intoxication has been reported in patients with renal dysfunction [2,3]. A previous report showed that appropriate dosing of pilsicainide in patients on hemodialysis is 25 mg before every dialysis and consecutive dose of 25 mg/day had induced elevated plasma concentration [1]. In this case, pilsicainide dose (50 mg/day) might be overdose for a patient on hemodialysis.

Pilsicainide has negative inotropic effects in a dose-dependent manner [7]. A single oral dose of pilsicainide decreases stroke volume index [5], and pilsicainide intoxication can cause hemodynamic collapse without ventricular tachyarrhythmia [3]. There have been no previous reports about hemodynamic profile during pilsicainide intoxication. This case has demonstrated, for the first time, left ventricular dyssynchrony during pilsicainide intoxication by ventriculography. This dyssynchrony seemed to be due to intraventricular conduction delay indicated by marked QRS prolongation on electrocardiography. Dyssynchronous left ventricular wall motion depresses global left ventricular function [8]. Actually, this patient presented with hypotension and right heart catheterization revealed decreased stroke volume index. After the withdrawal of pilsicainide, the hemodynamic profile improved with normalization of left ventricular function and narrowing of QRS width.

This patient presented with transient chest pain and palpitation before admission. Pilsicainide intoxication has been known to cause various arrhythmias [2,3,6], and a case of pilsicainide-induced coronary vasospasm has been reported [9]. Although electrocardiogram on admission had not showed arrhythmia and ST-segment elevation, these mechanisms may account for transient chest symptoms of this patient. After cessation of pilsicainide and hemodialysis, QRS width gradually narrowed, and blood pressure and pulse rate gradually stabilized. Thereafter, chest symptoms had not recurred.

In this case, Brugada-type electrocardiographic pattern had transiently appeared. Previous reports had presented elderly cases of pilsicainide intoxication presenting with Brugada-type electrocardiographic pattern, caused by renal dysfunction [2,10]. The relationship between Brugada-type electrocardiographic pattern and ventricular arrhythmia during pilsicainide intoxication is not clear.

Conclusion

We report a case of pilsicainide intoxication presenting with marked QRS prolongation and left ventricular dyssynchrony. We must be cautious when we prescribe pilsicainide for a patient on hemodialysis.

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